NESCAUM Permit Modeling Committee
2013 Annual Meeting
Burlington Harbor Marriot, Burlington, Vermont
June 11-12, 2013

Meeting Notes

Attending:
- Leiran Biton, NESCAUM
- Richard Fields, MA DEP
- David Healy, NH DEC
- Katy James, NESCAUM
- Lisa Landry, NH DES
- Wil Lemus, RI DEM
- Peter Mayes, NJ DEP
- Brendan McCahill, EPA Region 1
- Kevin J. Ostrowski, ME DEP
- Dan Riley, VT DEC
- Sam Sampieri, CT DEEP
- Leon Sedefian, NYS DEC
- Steve Snook, VT DEC
- Margaret Valis, NYS DEC
- Yiling Zhang, NJ DEP

Via telephone:
- George Bridgers, EPA OAQPS
- Roger Brode, EPA OAQPS
- Annamaria Coulter, EPA Region 2
- Donald Dahl, EPA Region 1
- Brian Hennessey, EPA Region 1
- Tom Downs, ME DEP

Tuesday, June 11, 2013

- *Objectives*

The objectives of the meeting include:
- Discuss common state issues
- Ensure consistency across the region
- Foster improvement of modeling and related analysis
- Develop states consensus over NESCAUM actions with regard to EPA technical guidance

- *Report back from the A&WMA Conference on "Guidelines to Air Quality Models: The Path Forward", Research Triangle Park, North Carolina, March 19-21, 2013 (Yiling Zhang, NJ DEP)*

Yiling Zhang (NJ DEP) reported back to the Committee on papers of particular interest to the NESCAUM region. At the conference, a total of 59 papers were accepted. In addition, EPA held a town hall style forum regarding their recent draft $PM_{2.5}$ guidance. Ms. Zhang described the following papers and their key findings, and the Committee discussed them further:
- Ambient Ratio Method Version 2 (ARM2) for AERMOD 1-hr NO2 NAAQS Analyses (RTP Associates).

    - Examined 10 years of NOx monitoring data from many monitors.
    - The ratio of 0.8 for NO2 to NOx typically used for the ambient ratio method only matches observations when the NOx concentrations are low (i.e., the emissions are aged). When the NOx concentrations are low, the ratio can be as low as 0.2 in observations.
    - The ARM2 method has been programmed into AERMOD v12345.
- CALPUFF modeling system status and availability (TRC)
    - EPA-approved CALPUFF v5.8 overestimates sulfate and nitrate production/visibility impacts
    - Non-approved CALPUFF v6.4.2 is backward compatible and has more accurate sulfate/nitrate conversion rates
    - Ownership issues related to the model (owned by TRC, developed by Scire) is possibly interfering with the use of the model
    - CALPUFF may be appropriate for use in estimating secondary PM2.5 impacts, as indicated in NESCAUM comments on EPA's draft PM2.5 permit modeling guidance
    - EPA is considering developing a replacement for CALPUFF, and may recommend the use of SCIPUFF as an alternative candidate
- Implementation and Evaluation of ISORROPIA in CALPUFF (Scire)
    - ISORROPIA II (v2.2 beta) contains chemistry that is used in CMAQ and CAMx
    - Enhancements to the model include a new flare modeling processor and a new GUI
    - Model evaluations indicate promising results
- Comparison of Regional Haze Impacts from EPA-approved and ISORROPIA versions of CALPUFF (CH2MHILL)
    - Ammonia concentrations are key for secondary formation of particulates
    - Authors recommend enhanced monitoring for ammonia near Class I Areas, but monitoring is problematic.
    - Secondary formation varies by time of day and by season, with a nighttime low and peak at 12 noon or 1pm.
- Probability Analyses of Combining Background Concentrations with Model Predicted Concentrations
    - Authors suggest revised approach for combining modeled source-related and monitored background 1-hr SO2 and NO2 concentrations so that the product of the individual probabilities equals the target probability; e.g., 90^{th} percentile monitored background with 90^{th} percentile modeled source-related concentrations purportedly corresponds with 99^{th} percentile total concentration (0.1 * 0.1 = 0.01)
    - Authors argue that 99^{th} percentile for each background and modeled concentrations is equivalent to 99.99^{th} percentile
    - Would need to be careful about implementation because attainment could be achieved by gaming the system (i.e., cherry-picking percentiles for combination based on lowest resulting total concentration
- General recommendations on Model Clearinghouse and Procedures (Steve Hannah)
    - Author encouraged EPA to create a more transparent and collaborative model clearinghouse, and presented several recommendations for improving it.
- Evaluation of SO2 and NOx Offset Ratios to Account for Secondary PM2.5 Formation (Minnesota)
    - There were several speakers who asked EPA to reevaluate the use of CALPUFF for secondary formation
    - This paper suggested an approach similar to NESCAUM's, using 10% SO2 and 1% NO2 (compared to 7% and 5$% suggested by NESCAUM)
    - Method is conservative as it assumes impacts at same location and time
- Screening Approach to Account for Secondary PM2.5 in Stationary Source Modeling (Bob Paine AECOM)

- Suggests multi-tiered, purely numerical approach to estimating secondary formation, but includes additional chemistry (ozone)

➢ *Connecticut's 1-Hour SO2 NAAQS Analysis and Management Strategy (Sam Sampieri, CT DEEP)*

Sam Sampieri presented on the analysis he performed for the 1-hour SO2 standard at four sites in Connecticut. Initial results show good match-up between the model and monitored concentrations. Issues raised include:

- Rural vs. urban modeling and the effects of population (raising the population decreases the concentrations in some cases)
  - EPA does not recommend using the urban option unless the population is over 2 million
  - However, the modeled results do not match the monitored concentrations unless the URBAN option is activated
- Principle drivers: these sources are mostly meteorologically driven; varying emissions has little effect due to the stack height
- Model version influences: AERMOD v12345 increased the concentrations by 10-15 ug/m3
- Impacts: found power plant to be a "peaker"—only runs when there is a need for heating or AC; emissions lengths are stable but only when the plant is operating

➢ *AERMOD Updates (Roger Brode, US EPA)*

Roger Brode presented on updates to Version 12345 of AERMOD. A copy of his presentation will be distributed to the meeting participants. The notes below only include summary of discussion that contains information not described in Mr. Brode's presentation.

- There are currently no plans to incorporate AERSURFACE into the regulatory system, though with the progress in recent revisions, EPA may revisit that issue.
- At the 11th modeling conference, EPA may propose changes to the AERMOD system, including incorporation of the u* beta options.

➢ *Group Training and Discussion I (George Bridgers, EPA OAQPS)*

- The January 22 court decision vacated and remanded of SMCs and SILs for PM2.5, meaning that states must have representative background data. There will be pieces of the ruling that get challenged, but the applicant and reviewing authority need to make sure that the data is solid, if it cannot be categorized as pre-construction data. After January 22 ruling, some states adopted regulatory texts by reference. The EPA has not yet put in the rulemaking request for striking language about SILs from the Federal Register, which means there is currently a disconnect between the FR language and what states have in their SIPs. For SILs by reference in SIPs, this is not a problem. For those SILs that are referenced explicitly, there is an issue. In the absence of any kind of replacement, SILs will be vacated. The court only ruled on PM2.5, but the decision may affect other pollutants.
- SILs are partially gone, but states can still rely on 165 B2, which states that a source in an area cannot have an impact greater than SILs in a nonimpact area. Additionally, SILs can be used to determine causes of any violations that occur.
- Minnesota, as well as other states in Regions 5 and 10, have been using background for modeling PM2.5. More and more states are looking at having a limited monitoring system and are developing creative ways to generate data so there is no need to implement pre-construction monitors.
- If the concentrations used by permitting authorities are below levels required by EPA, states do not have to account for background levels, as this is against the CAA. If there is a monitoring

system in place that is robust enough, it should be used. There is an upcoming memo stating that states can rely on modeling in specific situations. There has to be some comparison to the background data at every point in the analysis.

- Scire conducted SCG analysis for the Region 4 permit in Summerville, South Carolina, which is a justifiable example of looking at sources some distance away and relating them to your source. EPA OAQPS hopes to use it as an example.
- It would be helpful to have something from the EPA supporting the states' methods for SO2 modeling.
- The secondary and primary formation and spatial impacts will be different. The revised non-draft version of the guidance document will be released September 30th, and the EPA is planning to have a biannual or quarterly webinar so everyone affected can be apprised of changes to policy.
- The sequester will not significantly impact work—the EPA is done with the first phase of furloughs, and the majority of the remaining furlough hours have been used.

➢ *Experience Sharing for Submission of Tier 3 PVMRM 1hr NO2/NOx Modeling (Wilfredo Lemus, RI DEM and Kevin Ostrowski, ME DEP)*

- There are currently four Class I areas in the state of Maine. Mr. Ostrowski focused on two paper mills located in river valleys—both sources had attempted to model for the new NO2 standard and had failed using Tier I and Tier II approaches for the 1hr standard. The PVMRM/OLM method was used to pair up ozone data with meteorological data. Both sites explicitly spelled out their methodologies in a memo explaining the need to use Tier III.
- Although both sources had on-site meteorological data, the met data for modeling was difficult to match with 20-year old ozone data. Linear interpolation or a default value of 40 ppb was used in order to discern if there were missing data in the hourly ozone. An in stack ratio of 0.1 was used, which is lower than the current required ratio of 0.5.
- Mr. Lemus discussed Toray Plastics' modeling issues. The site could not meet compliance using Tier III, so original stack height was increased from 52 feet to 75 feet. After the increase, the site passed with Tier I. Although the consultant at Toray was approved to use a 0.5 ratio, a ratio of 0.1 was used. This is allowed if there is evidence to support this decision.
- The EPA is trying to create a database of in-stack values but sources are reluctant to give up their data. Kevin specified a date to complete the review and Wil suggests that this was a good approach. Both Wil and Kevin recommend that agencies stay in touch with EPA about the review process. The database in question should be populated by the community, so an outreach program is needed.
- Tyler mentioned that facilities should use PVMRM and permit condition with CEMS data so EPA and other state agencies can use in-stack ratios as reporting requirements.

➢ *SO2 Modeling Case Study (Margaret Valis, NYS DEC)*

Ms. Valis presented an evaluation of single source 1-hour SO2 impacts with CEMS data and EMVAP, using Dunkirk, NY as a case study. Modeled results at the site were almost 3 times the monitoring design value. When CEMS data was compared with monitored SO2 values, it was found that emissions trended with monitored levels. The pollution rose showed a high concentration coming from Dunkirk. It was found that EMVAP was not calculating the 4th highest value correctly and was not capturing the worst case at all times. CEMS data shows a much more realistic picture of SO2 attainment. Problems still may arise, but will not be as problematic as allowable emissions. In conclusion, it was found that AERMOD works well with CEMS.

➢ *New York's Proposal on Secondary Formation of PM2.5 (Leon Sedefian, NYS DEC)*

Mr. Sedefian gave a presentation on the secondary formation and impacts of PM2.5 in regional models. The EPA's recommendations in the 3/4/13 Draft Guidance were not found to be viable. For urban and rural sites in NY, the main compounds that agencies should be concerned about are nitrates, sulfates, and OM. Therefore, the simulation of these three compounds is the most important.

A study was conducted of two sites—Queens College (urban) and Pinnacle State (rural)—which found the concentration of nitrates in urban areas to be twice of that found in rural areas. Organic matter (OM) levels were 60 percent higher in urban areas. The PM2.5 speciation data show a clear dominance of secondary component associated with transport into the area at both urban and rural sites. The NYS DEC recommends that the EPA develop a secondary formation screening tool and suggests that NESCAUM develop PM2.5 secondary formation guidelines.

Wednesday, June 12, 2013

- *State Updates*

Connecticut (Sam Sampieri)

- Modeling for 1-hour SO_2, not conducting permit modeling yet
- Posted met datasets for 2008-2012 on the webpage
- State guideline model is continuing to be updated from 2009 and will be ready to release in the coming months
- DEEP has smoothed out the air permit process to cut time in half; inventory is no longer subject to FOIA requirements
- There is a push to get off of fossil fuel in CT—wind, solar, electric cars; state is currently trying to get all residents access to natural gas by having a payment plan upfront with electricity companies

Maine (Kevin Ostrowski and Tom Downs)

- Marc Cone, a former permit engineer, has been appointed new air director
- Facilities optimizing their processes, which includes converting boilers from firing #6 fuel oil to using natural gas
- The natural gas market is picking up—some facilities are trucking in CNG (8-10 deliveries per day)
- Minor sources, like high schools, are moving towards pellet based fuel in order to lower fuel costs
- Torrefied wood pellets manufacturing plant Thermogen in Northern Maine (former paper mill) is under construction.
    - Considering an additional location in Eastport
    - Bark is used as raw material, residue from paper making ground up and microwaved
    - Received request from medical center to lower stack after fuel change from #6 fuel oil to natural gas
    - New large wood pellet facility near Callas (next to Moosehorn Wildlife Area) has not applied for a permit yet; would need to meet LAER
    - McCain's French Fries—had two facilities where they manufacture potato products, and a secondary plant where they manufacture scraps into feed for livestock; are currently taking waste potatoes into a digester and using the off-gas for fuel
    - Red Shield Paper Mill near Bangor is working with the University of Maine and is installing a demonstration scale cellulose biofuel refinery, which takes the brown stock from the pulp mill and deconstructed woody biomass undergoing enzematic hydrolysis to make sugars
    - 30 permits in the last year
    - Awaiting EPA's final designation on SO_2
- Awaiting EPA's approval of the NOx waiver, as well as the partial opt out from NSR for VOCs

- Meeting with the EPA to set minor source cutoffs, so 110L will no longer be necessary
- Reorganization of the modeling group has moved Tom and Martha into the monitoring data analysis division; Tom will continue to be involved in major national guidance efforts, but will not be doing any modeling

Massachusetts (Richard Fields)

- Asking large sources to do demonstrate attainment through modeling (not required, may be submitted to EPA)
- The Sierra Club wants to model using on-site met data from 1990-1994
    - Barnes Airport is another source of met data
    - Agreed to use on-site data with 15-minute averages and 0.2% calms
- Only one modeler on staff, as Steve Dennis is retiring
- Looking at SO2 from Solutia, currently burning natural gas but permitted to burn oil
    - Wanted to use the u*_adj in AERMOD v12345, but insufficient technical justification
- Salem Harbor
    - Currently winding down operations—2 boilers (one coal, one oil) are left that will be shut down completely in 2014
    - Salem Harbor Footprint Power NG, a cogen facility, will take its place
    - Protocol was approved and modeling was completed
- Issues regarding citizen complaints about noise and shadows from windmills

New Hampshire (Lisa Landry and David Healy)

- Lisa is the only full time modeler and the number of permit projects is down to about 30 (typically 50-60 in previous years)
- Modeling guidance document needs to be updated this year
- Rulemaking changes made in 2012:
    - Added different thresholds for modeling for facilities with a greater emphasis on those that have large impacts and get rid of smaller modeling exercises
    - Added in requirements for protocol—there is now a checklist, but there is no protocol approval process; can be submitted at the same time as modeling
- Higher sulfur fuel is not readily available—sources are asking for permit limit reductions because they are switching over to lower sulfur fuel
- Schools are switching to wood fired boilers (pellets) with ESP controls
- 2008-2012 met data were processed with the newest version of AERMOD—results will be processed soon

New Jersey (Peter Mayes and Yiling Zhang)

- Five modelers currently reviewing seven natural gas and combined cycle projects (4 have been completed, other 3 are significant for 1-hr NO2 and 24-hr PM2.5)
- Conducted 20 health risk assessment for non-emergency Diesel Stationary Engines (using CA diesel risk values)
- Emergency generators are allowed to run for 50 hours per year (standard maintenance and testing, etc.) and are excluded from modeling if they accept these conditions
- Currently in the process of updating met data from 2008-2012
- NJ was significantly impacted by Hurricane Sandy—5 refineries had controls knocked out at gasoline loading docks; NJ DEP will complete multisource modeling to look at short term benzene impacts
- DEP is looking at diesel emissions by railroads, as refineries are deciding to deliver crude oil from North Dakota by rail

    - Tier 3 OLM and hourly ozone data plus background NO2 seasonal hourly methodology—are using the default for the in-stack ratio, but are using a ratio of 0.1 based on the case study given the subject (trains)
- Portland power plant is being shut down via the 126 petition, which means that it will stop burning coal by 2014 and is likely to shut down completely
- NJ has achieved the PM2.5 standard and is working with the EPA for reclassification
- The ports of Newark and Elizabeth have electrified some equipment or are switching to #2 ULSD leading to significant emissions reductions
- NJ has over 200 Title V sources—risk assessment is required if speciated emissions are over the threshold for any NJ incremental cancer risk

<u>New York (Margaret Valis)</u>

- Hurricane Sandy
    - Emergency enforcement discretion is in place to allow certain sources to operate without controls—many generators were used, which required monitoring
    - Large efforts made to turn debris into compost in both Brooklyn and Queens
- NYC DEP was able to get an estimate of expected PM impacts from dispersion
- NY still has a handful of coal burning sources that have permits to burn coal but do not necessarily run on it
    - Sierra Club commented and modeled for facility that converted to natural gas for all but one unit and wants the DEC to revoke the use of coal at the facility altogether
    - DEC will require modeling to demonstrate that they are not causing a violation
- NY has achieved attainment for PM25 and has applied for redesignation. Until the EPA grants the state attainment status, any source coming in is still subject to the source nonattainment rule

<u>Rhode Island (Wilfredo Lemus)</u>

- Updates to the modeling guidelines were posted in March that address air toxics modeling as well as NAAQS
- Providing pre-processed met data on the website
- Protocol is now compulsory
- RI DEM petitioned the EPA about PVMRM regarding the Toray cogen plant; EPA supported RI DEM's position
- Laundry facilities are out of compliance for VOC emissions in Rhode Island and are operating without a permit
- There were issues with modeling the Providence metro area for a single facility
    - Had combined the population for the entire state of RI, as well as Fall River (MA) and parts of Connecticut
    - Should focus on the contiguous (urban heat island) densely populated area
    - 750 people/sq km is the definition of an urban area

<u>Vermont (Dan Riley)</u>

- Modeled for landfills in the state when one added an additional gas engine
- DEC is using AERMET with AERMINUTE
- Larger #6 oil users are switching to natural gas; all of these require permits for oil
- LEAN will be implemented in VT
- Proposed whiskey distillery at a farm—still deciding on the size
    - Will emit 20 tons per yr of ethanol
    - Concerned neighbor is modeling hourly emissions
- PM2.5 modeling minor new sources—surveyed states present and found that some have "shall not create condition of air pollution" provisions
- Dick Valentinetti is retiring as Air Director—his replacement has not yet been announced

- There have been issues with met data representative, as everything outside of the Champlain Valley qualifies as complex terrain
    - ASOS from plain location used in a valley scenario could underpredict
    - Safer to use conservative terrain conditions (complex), so diurnal temperature and wind speed are simulated for overnight

- *Report back from the 2013 EPA Regional/State/Local Modelers Workshop, Dallas, Texas, April 22-25, 2013 (multiple attendees)*

Those who attended the conference in Dallas presented a summary of what was discussed.

Documents presented at the meeting are available on the website, http://www.cleanairinfo.com/regionalstatelocalmodelingworkshop/archive/2013/agenda.htm.

- *Group Training and Discussion Section II (George Bridgers, OAQPS)*

EPA is in the process of revising the CALPUFF model to incorporate bug fixes included in version 6.4 to resolve this issue without addressing other unrelated model issues. EPA is currently searching for a replacement for CALPUFF—this includes SCICHEM and other models that, based on current evolution and development, are pacing themselves ahead of CALPUFF. Contact Kirk Baker with questions about SCICHEM or CAMx. Contact George directly about technical policy or applications. Comments on the Modeling and Monitoring TAD are due on July 22nd.

If the modeling for NSR uses beta options, it may be approved with the right justification. It needs further consultation and approval from the regional office. Canned winds should use the regulatory option. (See subsequent 6/26/2013 statement pursuant to the beta options at the following website: http://www.epa.gov/ttn/scram/models/aermod/20130626-Statement_on_Beta_Options.pdf)

- *Committee Chair was passed from Vermont (Dan Riley) to Connecticut (Sam Sampieri)*

NESCAUM thanks Dan Riley for his hard work and commitment to the Committee over the last year.

- *States Only Session*

- *The next call of the PMC will be on September 5, 2013 at 10am.*